Appl. S.N. 10/797,329
Amdt. Dated
Reply to Office Action of May 1, 2007

RD29334-1

Amendment to the Claims:

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

CLAIMS:

1. (original) A non-contact measurement system for providing gauge measurements of an object, comprising:

at least one light source to illuminate said object with structured light;

an imaging device to obtain at least one image of said illuminated object;

an image register configured to store information corresponding to a reference model of said object and at least one image of said object;

a transformation estimator coupled to said image register and adapted to register said at least one image of said object to said object reference model; and

a gauge measurement module configured to receive said registered image of said object and to identify gauge measurements from said registered image of said object.

2. (original)   The non-contact measurement system of Claim 1 wherein said image register is configured to store one or more sets of patches associated with said object reference model and one or more sets of patches associated with said at least one image of said object.

3. (original) The non-contact measurement system of Claim 2 wherein said transformation estimator is configured to compare patches associated with said object reference model with corresponding patches associated with said at least one image of said object to register said at least one image of said object with said object reference model.

4. (original) The non-contact measurement system of Claim 1 further comprising a filter module coupled to said image register for filtering a registered scanned image and removing noise.

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5. (original)   A method of providing non-contact gauge measurements of an object comprising the steps of:

projecting structured light using at least one light source on said object to illuminate said object;

obtaining at least one image of said illuminated object;

providing data representative of a known reference model of said object;

registering said image with said reference model data; and

identifying gauge measurements of said object from said registered image of said object.

6. (original) The method of Claim 5 for providing non-contact gauge measurements of an object wherein the step of registering said image with said reference model data includes performing, at least once, the steps of:

(a) comparing a plurality of patches of said reference model data with a plurality of associated patches of said image to identify pose data for said image; and

(b) adjusting the pose of said image response to said identified pose data.

7. (original)   A non-contact measurement system for providing gauge measurements of an object, comprising:

at least one light source adapted to illuminate said object;

at least one imaging device for obtaining a scanned image of said illuminated object;

a memory configured to store data representative of a reference model of said object and data representative of at least one scanned image of said object obtained by said at least one imaging device;

at least one software module configured to manipulate said scanned image to increase a signal-to-noise ratio;

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at least one software module configured to register said scanned image with said reference model data;

at least one software module configured to process said scanned image to facilitate identification of edges of said object; and

at least one software module configured to extract gauge measurements from said scanned image.

8. (original)   The non-contact measurement system of Claim 7 for providing gauge measurements of an object wherein said light source is adjustable to alter an illumination level and said imaging device adapted to acquire two or more images of said object wherein each of said two or more images acquired at a different illumination level.

9. (original)   The non-contact measurement system of Claim 8 for providing gauge measurement of an object wherein said at least one software module configured to manipulate said scanned image to increase a signal-to-noise ratio is further configured to generate a composite image from each of said two or more images acquired at different illumination levels.

10. (original)   The non-contact measurement system of Claim 9 wherein said composite image comprises pixels representative of scaled values of light intensity within a predetermined light intensity range.

11. (original)   The non-contact measurement system of Claim 7 for providing gauge measurement of an object wherein said at least one light source is positioned to provide backlight illumination on said object; and,

said imaging device is further configured to obtain at least one image of said object illuminated by said backlight illumination at a first object orientation; and,

said at least one software module configured to register said scanned image with said reference model data is further configured to incorporate said at least one backlight illuminated image into registration processing.

12. (original)   The non-contact measurement system of Claim 11 for providing gauge measurement of an object wherein said imaging device is further configured to obtain at least a

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plurality of images of said object illuminated by said backlight illumination, each of said plurality of images at an associated object orientation; and

said at least one software module configured to register said scanned image with said reference model data further configured to utilize each of said plurality of images to approximate surface features of said object.

13. (original) The non-contact measurement system of Claim 7 for providing gauge measurement of an object wherein said at least one light source is positioned and configured to produce a linear highlight along an edge of said object; and

wherein said at least one software module configured to process said scanned image to facilitate identification of edges of said object further configured to identify said linear highlight in said scanned image.